A New Species of Nigella (Ranunculaceae) from Northeastern Turkey

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ABSTRACT. Nigella L. (Ranunculaceae) is distributed worldwide and is primarily centered in the Mediterranean region. Fourteen species are reported from Turkey, 10 of which are native. Specimens of the new species, N. koyuncui Dönmez & Uğurlu, were collected from Sinop, Turkey. It is distinguished from N. arvensis L. s.l. by several characters, including the dark red to purplish red central blotch of flowers, the whitish yellow sepals, yellow petals, large nectary pairs, and grouped stamens. Chromosomes of the new species have been studied for the first time, and the diploid number (2n) has been found to be 12.

Key words: Chromosome number, IUCN Red List, Nigella, Ranunculaceae, Turkey.

Taxa of Nigella L. (Ranunculaceae) fall into two major groups with respect to flower color, which is either yellow or blue with color variations within each group. The N. arvensis L. complex has bluish flowers, and the new species N. koyuncui Dönmez & Uğurlu, described here, is distinctly close to this complex by its entire set of characters, except as distinguished by the flower colors and features given in Table 1. During our monographic study, we recognized a Nigella specimen as a distinct species by its yellow flowers in the field (Dönmez et al., 2011a). Comparative studies in the floristic literature support our conclusion that this new species is affined to the N. arvensis complex yet is distinct by several character differences (Krasheninnikov, 1937; Davis, 1965; Meikle, 1977; Townsend, 1980; Pignatti, 1982; Zohary, 1983; Amich, 1986; Riedl, 1992; Tutin & Akeroyd, 1993; Strid, 2002). We discuss pollen and seed morphology of this new species and its close relatives and provide SEM micrographs. Chromosomes of the new species have been counted, giving a diploid number (2n) of 12.

Nigella koyuncui Dönmez & Uğurlu, sp. nov. TYPE: Turkey. Sinop: Boyabat, Uzunçay Village, 41°38′N 034°36′E, 442 m, 7 July 2009, A. A. Dönmez & Z. Uğurlu 15801 (holotype, HUB; isotypes, AEF, HUB, MO). Figure 1.

Haec species *Nigellae arvensi* L. affinis, a qua tamen macula centrali florum majore atrosanguinea vel violacea, sepalis albo-luteis, petalis aureis, nectariis majoribus et staminibus in fasciculos 8 insertis differt.

Annual herb, erect, simple to branched from base; stems glabrous to finely scabrid, 5-25 cm, striate. Leaves glabrous to scabrid, distributed throughout stem length; basal leaves petiolate, to 15 mm; lamina $5-25 \times 8-20$ mm, orbicular to obovate in outline, 2- to 3-pinnatisect, ultimate segments linear, 3–6 × 0.3–0.4 mm; stem leaves sessile or petiolate to 1-2 mm, 1- or 2-(3-)pinnatisect. Flowers solitary or 2- to 7-flowered raceme. Flowers 10–22 mm diam., with dark bloodred to purplish red central blotch; sepals 5, whitish to pale yellow with green midrib evident dorsally, divided into claw and limb; claw 3-5 mm in length; limb 4–8 × 4–7 mm, deltoid to orbicular, shortly attenuate to truncate at base, briefly cuspidate at apex, veins distinct, glabrous; petals (7)8, yellow, 4–5 × 2–3 mm with 4 to 10 long hairs, distinctly geniculate, upper (inner) lip widely triangular at lower half, 1 × 0.5 mm, upper half filiform, 1.8–2 mm, slightly clavate with purplish single transverse line at apex; lower (outer) lip widely ovate in outline; deeply divided into ovate halves, each half 2 mm, abruptly constricted into filiform portion, apex slightly clavate with single purplish line; nectaries green, as conic protuberance, with purplish single line, covering the petal base; stamens 40, in 8 groups, filaments 3–5 mm, anthers 1.9-2.1 mm, with apical appendage, greenish yellow, yellow at maturity. Capsules 2 to 4 per flower, 20–24 × 2–3 mm (including apical beak), smooth, slightly tuberculate on ventral suture, connate to half capsule length, beaks ca. equal to capsule, each capsule with 3 (to 5) distinct veins; seeds $2-2.1 \times 1.4-1.6$ mm, mostly triquetrous, with

doi: 10.3417/2012040 Novon 23: 411–415. Published on 9 January 2015.

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Table 1. Morphological differences between Nigella koyuncui Dönmez & Uğurlu and N. arvensis L. s.l.

	N. koyuncui	N. arvensis s.l.
Sepal color	whitish to pale yellow	bluish to greenish white, rarely white
Petal color	yellow	from blue to light brown
Color of central blotch of flower	dark red to purplish red	absent or dark violet
Ornamentation of outer petal lobes	one transverse line at apex	more than one transverse line
Nectary	covering the petal base	covering half or less of the petal base
Stamens	40, in groups of 8	20–45, but not in groups (or rarely)

black and a few white tubercles, indistinctly winged on margin.

Distribution. Nigella koyuncui is endemic to northeastern Turkey in Sinop Province. The locality is considered an element of the Irano-Turanian floristic region. The new species is known only from populations at two locations.

IUCN Red List category. Nigella koyuncui is known from two localities 20 km away from each other. Field studies at the first location near the village of Uzunçay revealed more than 100 mature individuals. The second population at Čayköy is composed of approximately 50 individuals. We surveyed other likely locations for additional populations of the species in the region. Unfortunately, new populations were not found because the species is not widespread. We have evaluated the data gained from the field studies according to the IUCN categories (Criteria Bla) (IUCN, 2001), and we propose the conservation status of Endangered, or EN, for *N. koyuncui*.

Phenology. Nigella koyuncui has been observed to flower from July to August.

Etymology. The epithet of Nigella koyuncui honors the Turkish taxonomist Prof. Dr. Mehmet Koyuncu (1944–) from Boyabat, which is the type locality of the species.

Discussion. Since their initial descriptions, Nigella, Garidella L., and Komaroffia Kuntze have been evaluated at different infrageneric levels by various authors. In a recent classification of the tribe Nigelleae, Tamura (1993) accepted them at the generic level, and we follow this treatment here.

The taxa of the *Nigella arvensis* complex are found from the Azores Islands to Kyrgyzstan with approximately 10 species and 40 subspecific taxa, according to the local floras mentioned above. Besides this, a new classification for the species has been recently proposed (Dönmez et al., 2011a), and *N. arvensis* is

represented by three varieties worldwide. Nigella koyuncui is closely allied to this species in respect to habit, leaf, and fruit shape. Owing to several characters discussed below and detailed in Table 1, the specimens we have studied here are described as a new species.

The showy flowers of *Nigella* taxa are their most prominent feature and have been extensively used to distinguish them. The principal flower colors in *Nigella* taxa are blue and yellow, but whitish, brownish, and greenish variants are also present in some species. With respect to these flower colors, the genus has been divided into three groups identified as the *N. arvensis* complex, with blue color; the *N. orientalis* L. complex, with yellow color; and the *N. unguicularis* (Poir.) Spenn. complex, with brownish color. The first two groups remain included in *Nigella*, according to a recent generic classification (Tamura, 1993), while the third group is referred to *Garidella*.

The flower color of Nigella koyuncui is close to the N. orientalis complex, with both being characterized by yellow flowers. However, other floral characters affine the new species with N. arvensis s.l., but it can be otherwise distinguished by several characters. Sepal color of the N. arvensis complex is basically blue or variants of blue, but it has been mentioned as rarely dirty white by Davis (1965) or ashy white by Strid (2002). These variants have been seen among the N. arvensis complex during field trips in Turkey, Syria, and Greece. The dirty white or ashy white coloration is a paler variant of blue, and the color of the sepals becomes more bluish when dried. In contrast, the sepal color of N. koyuncui is clearly whitish or yellowish white, and this coloration is distinctly yellowish when dried. Furthermore, the yellowish color remains distinctive in specimens collected two decades ago. Approximately 100 specimens have been observed at the type locality, and in all of these the petal color is pure yellow, and there is no variation or suffusion with another color.

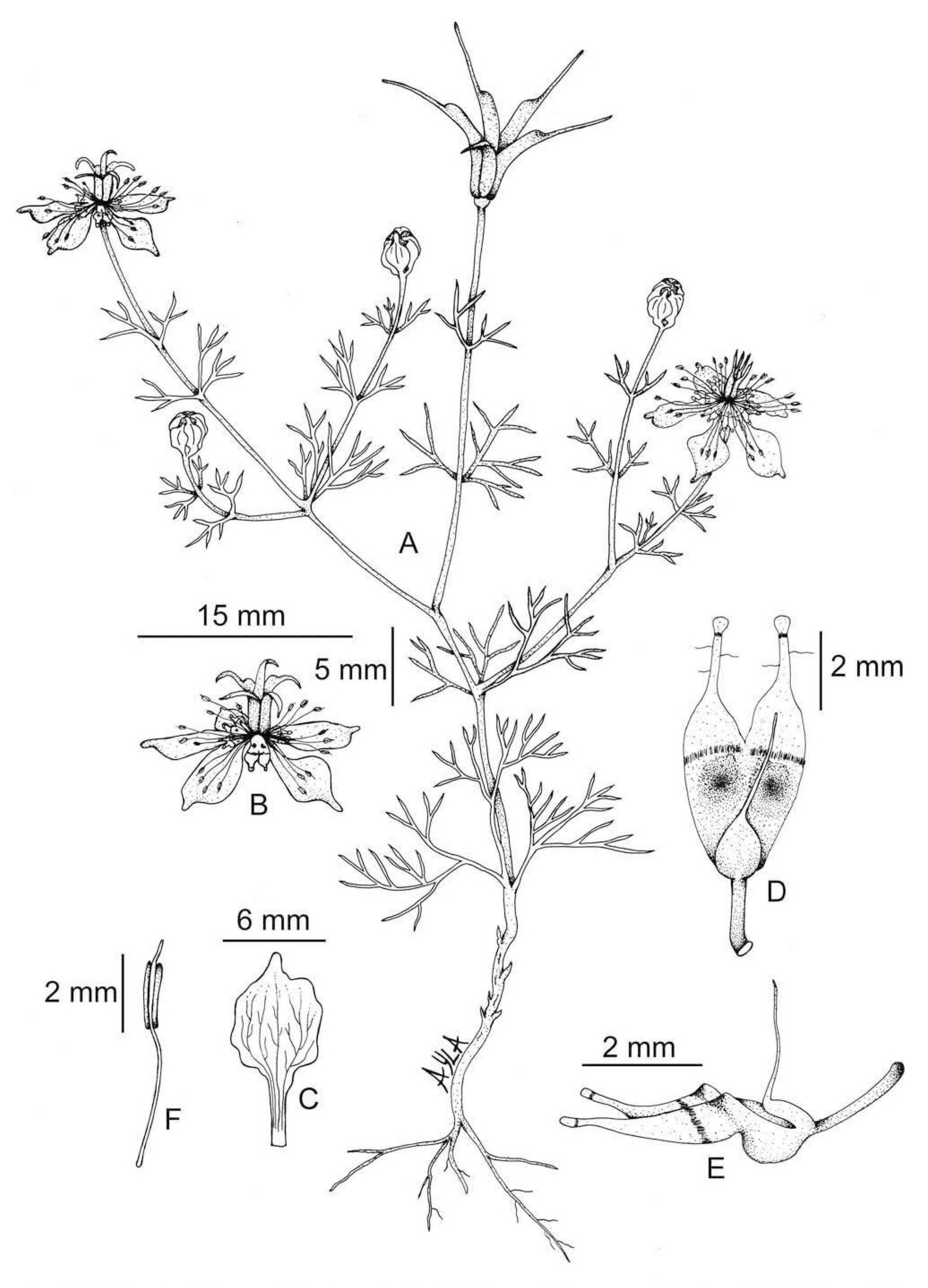


Figure 1. Nigella koyuncui Dönmez & Uğurlu. —A. Fertile habit. —B. Flower. —C. Sepal. —D, E. Petal. —F. Stamen. A–F, drawn from the HUB holotype A. A. Dönmez & Z. Uğurlu 15801.

Pollen morphology of the *Nigella* taxa is not useful at the species level but does confirm the genus placement. The pollen of *N. koyuncui* is trizonocolpate, polar length is $32.5\text{--}40~\mu\text{m}$, equatorial length is $35\text{--}41.25~\mu\text{m}$, pollen shape is oblate spheroidal, amb

is circular, and apocolpium index is 0.27. Detail of the exine ornamentation at the mesocolpium can be seen in Figure 2A. Seed morphology of *Nigella* taxa is a subject for detailed research, and an identification key has been prepared (Dadandi et al., 2009;

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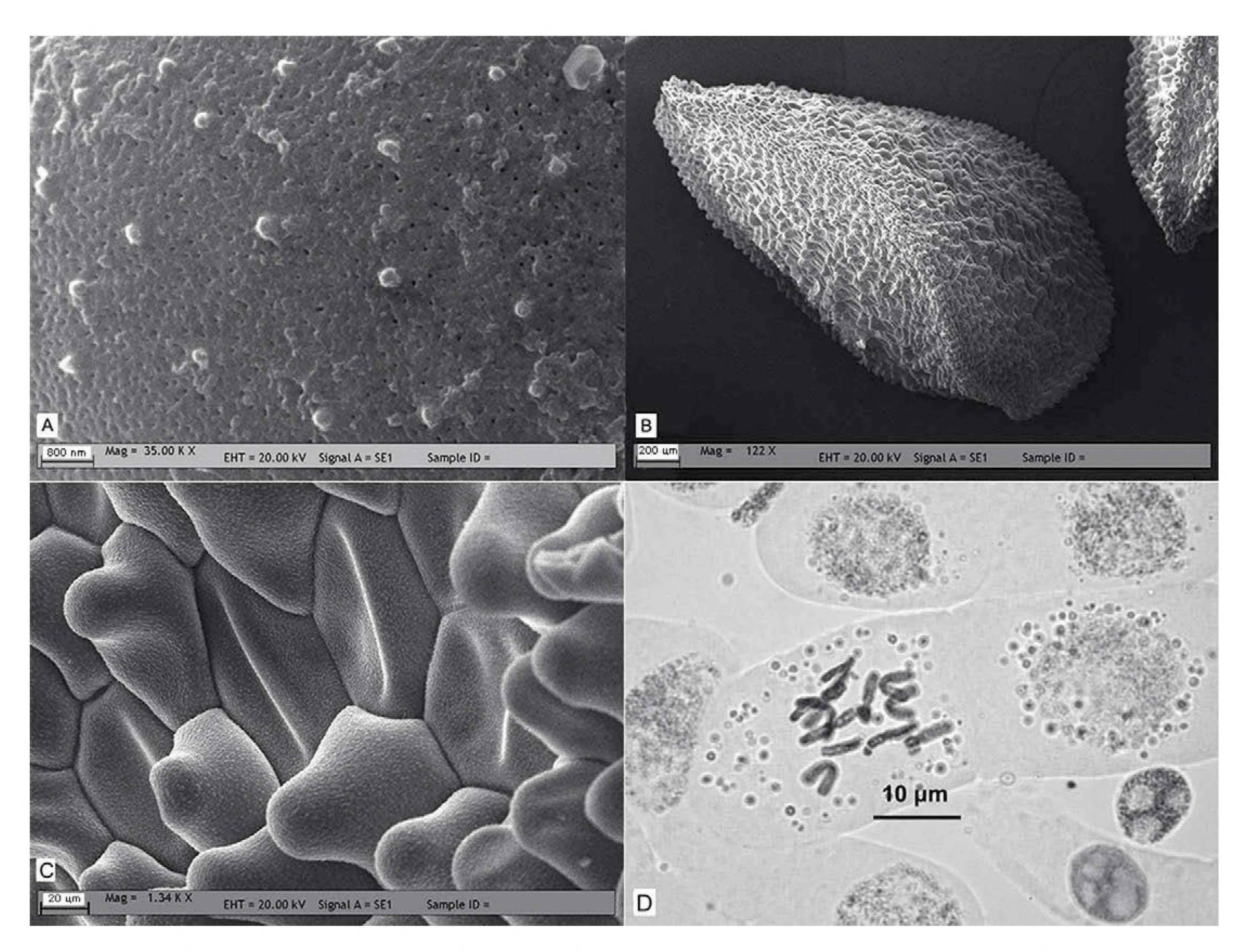


Figure 2. Nigella koyuncui Dönmez & Uğurlu. —A. Pollen, exine ornamentation at the mesocolpium. Taken from the HUB paratype A. Dönmez & Z. Uğurlu 17223. B, C. Seed morphology. —B. Intact seed view. —C. Closer view of seed coat ornamentation. B, C, taken from the HUB paratype A. Dönmez & Z. Uğurlu 17475. —D. Chromosomes, showing 2n = 12. Root tip preparation taken from the HUB paratype A. Dönmez & Z. Uğurlu 17475.

Dönmez et al., 2011b; Heiss et al., 2011). SEMs of the new species *N. koyuncui* appear in Figures 2B and 2C. The diploid chromosome number (2n) of the *N. arvensis* complex is 12 (Strid, 1970). The same diploid number (2n) has been confirmed for the new species (Fig. 2D).

Paratypes. TURKEY. Sinop: Boyabat, Uzunçay village, 41°38′N 034°36′E, 442 m, 7 Aug. 2009, A. A. Dönmez & Z. Uğurlu 16019 (HUB), A. Dönmez & Z. Uğurlu 17223, A. Dönmez & Z. Uğurlu 17475 (HUB); Boyabat, Cayköy village, 550 m, 21 July 1993, A. A. Dönmez 3664, with H. Şağban & A. Kahraman (HUB).

Acknowledgments. The specimens of Nigella koyuncui were collected and photographed during field trips to Sinop within the context of the projects supported by the Research Unit of Hacettepe University (BAB-0801601010).

Literature Cited

Amich, F. 1986. Nigella L. (Ranunculaceae). Pp. 219–226 in S. B. Castroviejo, M. G. Laínz, G. L. González, P. R. Montserrat, F. Muñoz Garmendia, J. A. R. Paiva & L. P.

Villar (editors), Flora Iberica: Vascular Plants of the Iberian Peninsula and Balearic Islands, Vol. 1. Royal Botanical Garden of Madrid, Madrid.

Dadandi, M. Y., G. Kökdil, A. İlçim & B. Özbilgin. 2009. Seed macro and micro morphology of the selected *Nigella* (Ranunculaceae) taxa from Turkey and their systematic significance. Biologia 64: 261–270.

Davis, P. H. 1965. Nigella L. (Ranunculaceae). Pp. 98–105 in P. H. Davis (editor), Flora of Turkey and the East Aegean Islands, Vol. 1. Edinburgh University Press, Edinburgh.

Dönmez, A. A., B. Demirci, O. E. Dönmez & Z. Uğurlu. 2011a. Nigella L. (Ranunculaceae) Türleri Üzerinde Taksonomik ve Kimyasal Araştırmalar. Project no. 107 T 686. TÜBİTAK-TBAG (Scientific and Technological Research Council of Turkey—BSRG), Ankara.

Dönmez, A. A., Z. Uğurlu, Ö. Dinçel & B. Taşçı. 2011b. Taxonomy of the genus *Nigella* and the closely related genera, *Garidella* and *Komaroffia* (Ranunculaceae): Based on seed characters. P. 100 in T. Borsch, P. Giere, J. Hoffmann, R. Jahn, C. Löhne, B. Nordt & M. Ohl (editors), BioSystematics Berlin 2011: Programme and Abstracts. 21–27 February 2011. Botanic Garden and Botanical Museum Berlin-Dahlem, Berlin. http://www.biosyst-berlin-2011.de/Biosystematics_Abstracts.pdf, accessed 6 October 2014.

- Heiss, A. G., M. Kropf, S. Sontag & A. Weber. 2011. Seed morphology of *Nigella* s.l. (Ranunculaceae): Identification, diagnostic traits, and their potential phylogenetic relevance. Int. J. Pl. Sci. 172(2): 267–284.
- IUCN. 2001. IUCN Red List Categories and Criteria, Version 3.1. Prepared by IUCN Species Survival Commission. IUCN, Gland, Switzerland, and Cambridge, United Kingdom.
- Krasheninnikov, I. M. 1937. Nigella L. (Ranunculaceae). Pp. 50–57 in V. L. Komarov & B. K. Shishkin (editors), Flora USSR, Vol. 7. Botanical Institute of the Academy of Science of the USSR, Israel Program for Scientific Translations. Keter Press Binding, Jerusalem.
- Meikle, R. D. 1977. Nigella L. (Ranunculaceae). Pp. 60–64 in R. D. Meikle (editor), Flora of Cyprus, Vol. 1. Kew, London.
- Pignatti, S. 1982. Nigella L. (Ranunculaceae). Pp. 283–284 in S. Pignatti (editor), Flora d'Italia, Vol. 1. Edagricole, Bologna.
- Riedl, H. 1992. Nigella L. (Ranunculaceae). Pp. 24–34 in M. Iranshahr, K. H. Rechinger & H. Riedl (editors), Flora Iranica, Vol. 171. Akademische Drucku Verlagsanstalt, Graz.

- Strid, A. 1970. Studies in the Aegean flora: XVI. Biosystematics of the *Nigella arvensis* complex with special reference to the problem of non-adaptive radiation. Opera Bot. 28: 1–169.
- Strid, A. 2002. Nigella L. (Ranunculaceae). Pp. 3–13 in A. Strid & K. Tan (editors), Flora Hellenica, Vol. 2. A. R. G. Gantner Verlag, Koenigstein.
- Tamura, M. 1993. Nigelleae (Ranunculaceae). P. 574 in K. Kubitzki, J. G. Rohwer & V. Bittrich (editors), The Families and Genera of Vascular Plants, Vol. 2. Springer-Verlag, Berlin.
- Townsend, C. C. 1980. Nigella L. (Ranunculaceae). Pp. 675–683 in C. C. Townsend & E. Guest (editors), Flora Iraq, Vol. 4, Pt. 2. Ministry of Agriculture & Agrarian Reform Republic of Iraq, Baghdad.
- Tutin, T. G. & J. R. Akeroyd. 1993. Nigella L. (Ranunculaceae). Pp. 251–253 in T. G. Tutin, N. A. Burges, A. O. Chater, J. R. Edmondson, V. H. Heywood, D. M. Moore, D. H. Valentine, S. M. D. Walters & D. A. Webb (editors), Flora of Europaea, Vol. 1, 2nd ed. Cambridge University Press, Cambridge.
- Zohary, M. 1983. The genus *Nigella* L. (Ranunculaceae): A taxonomic revision. Pl. Syst. Evol. 142: 71–107.